DOCUMENT RESUME

ED 297 976 SE 049 478

AUTHOR Sworder, Steve
TITLE Exclusivity of the Mathematics Department in Certifying Associate Degree Mathematics Competency.
PUB DATE Apr 87
NOTE 78p.; A study at Saddleback College, Mission Viejo, CA.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Associate Degrees; *College Mathematics; *Community Colleges; Higher Education; *Mathematics Achievement; Mathematics Education; Mathematics Skills; *Mathematics Tests; Minimum Competencies; *Minimum Competency Testing; State Colleges; *Two Year College Students; Undergraduate Study
IDENTIFIERS Saddleback College CA

ABSTRACT

This study was designed to determine the level of support among Saddleback College (California) students and faculty for maintaining the current exclusivity of the Mathematics Department in certifying student competence in mathematics as required for the associate degree. The study also identified current practices used by California community colleges to determine student competence in mathematics for the associate degree. The level of College support was measured using an opinion survey of full-time faculty members and the students enrolled in courses during the fall 1986 semester that satisfied the associate degree general education requirement in communication skills and critical thinking. Current practices employed by the 105 California community colleges were identified through a review of the catalog of each college and direct contact with the mathematics department chair of each of the 10 colleges for which the catalog supplied insufficient information. It was concluded that a high level of support existed for the exclusivity of the Mathematics Department in certification of student mathematics competence. (Author/PK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED297976

EXCLUSIVITY OF THE MATHEMATICS DEPARTMENT IN CERTIFYING ASSOCIATE DEGREE MATHEMATICS COMPETENCY

A Study at Saddleback College

Mission Viejo, California

April 1987

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Steve Sworder

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

by

Steve Sworder

Mathematics Department

SE 049 478

ABSTRACT

It was the purpose of this study to determine the level of support among Saddleback College students and faculty for maintaining the current exclusivity of the Mathematics Department in certifying student competence in mathematics as required for the associate degree. It was also the purpose of this study to conduct an inventory of current practices used by California community colleges to determine student competence in mathematics for the associate degree.

The level of College support was measured using an opinion survey of the 204 Saddleback College full-time faculty members and the 1863 Saddleback College students enrolled in courses during the fall 1986 semester that satisfied the associate degree general education requirement in communication skills and critical thinking. Completed questionnaires were received from 57 percent of the 204 full-time faculty and 79 percent of the 1070 students who actually had access to a questionnaire. The inventory of current practices employed by the 105 California community colleges was accomplished through a review of the catalog of each college and direct contact with the mathematics department chair of each of the ten colleges for which the catalog supplied insufficient information. The final inventory was composed of the practices of 97 percent of the 105 California community colleges.

It was found that 73 percent of the faculty and 63 percent of the students supported the exclusive position of the Mathematics Department in certifying student mathematics competence at Saddleback College. Because more than 60 percent of both groups supported this position,

it was concluded that a high level of College community support existed for the exclusivity of the Mathematics Department in certification of student mathematics competence. A similar exclusive position was found to exist at 46 percent of the community colleges in California.

The inclusion of a locally produced proficiency examination on the list of alternatives available for student demonstration of mathematics proficiency was a fact at 69 percent of the California community colleges and was desired by 61 percent of the Saddleback College faculty and 43 percent of the Saddleback College students. It was recommended that the Saddleback College Mathematics Department consider the development of such an examination. In view of the high level of College support for the exclusivity of the Mathematics Department in certification of student mathematics competence, it was further recommended that courses offered external to the Mathematics Department not be used for demonstration of mathematics competence.

TABLE OF CONTENTS

Page

LIST OF TABLES vii

Chapter

1. INTRODUCTION 1

Nature of the Problem 1

Purpose of the Study 1

Method of Investigation 2

2. BACKGROUND AND SIGNIFICANCE 3

Need for the Study from an Institutional Perspective . . . 3

Requirements for the Associate Degree 5

Review of the Literature 6

The Minimum Level of Mathematics Competence Recommended for Two-Year College Graduates 6

Recommended Methods for Student Demonstration of Mathematics Competence 9

Recommendations Concerning Mathematics Courses Offered External to the Mathematics Department 11

The Need for Policy Review in the Face of the Changing Community College 12

Summary of the Review of Literature and the Relationship to the Practicum 14

Relationship of the Study to the Seminar in the Emergence of Higher Education in America 16

3. PROCEDURES 17

Inventory of Current California Community College Practices 17

Collection of Data 17

TABLE OF CONTENTS (continued)

Chapter		Page
	Treatment of the Data	18
	Measurement of Support for Current Practices at Saddleback College	18
	Questionnaire Development	19
	Population	21
	Sample	21
	Data Collection	22
	Assumptions of the Investigation	22
	Limitations of the Investigation	23
	Definition of Terms	23
	Differences Between the Final Practicum Report and the Proposal	24
4.	RESULTS	25
	The State-wide Inventory of Mathematics Competence Demonstration Practices	25
	The Level of Faculty Support for Exclusivity of Mathematics Department Determination of Student Competence in Mathematics	29
	Treatment of the Data	29
	Results	30
	The Level of Student Support for Exclusivity of Mathematics Department Determination of Student Competence in Mathematics	31
	Treatment of the Data	31
	Results	32
5.	DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS	33
	Discussion and Implications	33

TABLE OF CONTENTS (continued)

Page

Recommendations 34

Potential for Positive Change 35

BIBLIOGRAPHY 36

APPENDICES

A. QUESTIONNAIRE AND COVER LETTER SENT TO COLLEGE MATHEMATICS DEPARTMENT CHAIRS 38

B. PRELIMINARY QUESTIONNAIRE 41

C. QUESTIONNAIRE USED FOR THE SADDLEBACK COLLEGE SURVEY 43

D. FACULTY SURVEY QUESTIONNAIRE COVER LETTER 45

E. COVER LETTER FOR QUESTIONNAIRE PACKETS SENT TO INSTRUCTORS OF CLASSES SELECTED FOR THE STUDENT SURVEY 47

F. COMPLETE LIST OF COLLEGES PARTICIPATING IN EACH CATEGORY OF MATHEMATICS COMPETENCE DEMONSTRATION PRACTICE 49

G. DISTRIBUTION OF ACUTAL FACULTY QUESTIONNAIRE RESPONSES STRATIFIED BY INSTRUCTIONAL DIVISION 54

H. DISTRIBUTION OF WEIGHTED FACULTY QUESTIONNAIRE RESPONSES STRATIFIED BY INSTRUCTIONAL DIVISION 57

I. DISTRIBUTION OF WEIGHTED STUDENT RESPONSES TO QUESTIONNAIRE ITEMS ONE AND TWO 60

LIST OF TABLES

Table		Page
1.	Categories of Demonstration Practices for Mathematics Competence	26
2.	Frequency of Individual Options Available to Students for Demonstration of Mathematics Competence	28
3.	Distribution of Actual Faculty Questionnaire Responses Stratified by Instructional Division	55
4.	Distribution of Weighted Faculty Questionnaire Responses Stratified by Instructional Division	58
5.	Distribution of Weighted Student Responses To Questionnaire Items One and Two	61

Chapter 1

INTRODUCTION

Nature of the Problem

Over the past few years the large occupational programs at Saddleback College have shown interest in sharing curriculum functions with the traditional academic disciplines. This includes offering similar courses placed in an applications setting and offering courses that satisfy certain portions of the general education requirements for the associate degree. These events have strained personal and professional relations between the members of several academic and vocational departments.

Anxieties recently developed among the mathematics faculty based on the belief that the Business Science Division would soon seek permission to certify student mathematics competence for the associate degree. It was felt that an objective, College-wide review of the associate degree graduation requirements in mathematics would confirm support of the exclusivity of the prerogatives of the Mathematics Department in this area. This would, in turn, reduce the developing anxieties and promote the collegial nature of the Campus environment.

Purpose of the Study

It was the purpose of this study to determine the level of support among Saddleback College students and faculty for maintaining the current exclusivity of the Mathematics Department in determining

student competence in mathematics to meet that portion of the State mandated minimum requirements for the associate degree. It was also the purpose of this study to conduct an inventory of current practices used by the community colleges in California to determine student mathematics competence for the associate degree.

Method of Investigation

A questionnaire was developed that encompassed most of the methods used by community colleges in California for student demonstration of mathematics competence. This questionnaire was used as the measurement instrument in an opinion survey of all full-time Saddleback College faculty and a sample of Saddleback College students. Their responses to the survey statements were tallied. This tally was used to determine the level of support held by these two groups for the exclusivity of the Mathematics Department to certify this competence.

The inventory of current practices in California community colleges related to the student demonstration of mathematics competence to meet the minimum requirements for the associate degree was conducted by examining the catalog of each community college in California. The mathematics department chair of each college that did not explicitly describe the procedures available to students to demonstrate mathematics competence was contacted by mail and asked to supply that information.

Chapter 2

BACKGROUND AND SIGNIFICANCE

Need for the Study from an Institutional Perspective

Over the past few years, the large occupational programs at Saddleback College have shown interest in sharing curriculum functions with the tradional academic disciplines. Communication Fundamentals (Speech 1) and Interpersonal Communications (Speech 200) offered by the Division of Fine Arts and Communications have been joined by Oral Business Techniques (Management 102/Office Information Systems 112) taught by the Business Science Division on the list of courses that satisfy the "Oral Communications" general education requirement for the associate degree (Saddleback College, 1986a:23). As the result of several Saddleback College Curriculum Committee discussions during the 1985-1986 academic year, the Computer Information Management Department of the Business Science Division was granted the right to share the offering of computer programming language courses with the Mathematics and Computer Science Department (since split into two separate departments) of the Mathematics, Science, and Engineering Division. This decision was unanimously opposed by the representatives of the Mathematics, Science, and Engineering Division on the Curriculum Committee. This Committee action was particularly mystifying to the Dean of the Mathematics, Science, and Engineering Division because he has always considered the mathematics and computer science offerings as generic service programs to the College as a whole. It was his

belief that business science students are competently served by his Division's courses in both mathematics and computer programming languages. It was the position of the Curriculum Committee that the new courses were substantively different from the existing courses because the new courses would be offered in a specifically business applications format.

Following this curriculum development, the speculation within the Mathematics, Science, and Engineering Division was that the future creation of vocational or applications based versions of technically oriented courses offered by the Division would not be limited to computer programming languages. Anxiety grew within the Mathematics and Computer Science Department based on the belief that the Business Science Division would soon challenge the exclusivity of the Department in offering courses that satisfy the mathematics competence portion of the minimum requirements for the associate degree. The Department was given this position in 1968 with the founding of the College, but before the full development of the large vocational divisions on Campus. No information was available concerning the College community's current position in this area and thus no means existed to adequately address the faculty's anxiety. This study, however, provided the needed information.

In an independent development concerning student demonstration of mathematics competence for the associate degree, the Division Dean of Mathematics, Science, and Engineering notified the Dean of Counseling and Special Services in July, 1986 that the Mathematics Department authored and Division administered Mathematics Proficiency Test would no longer be offered as a means for student demonstration of mathematics

competence for the associate degree (Bartlett, 1986:1). This action reflected a Department position taken in October, 1984 during a never completed College-wide review of all associate degree requirements. The Dean of Instruction responded to this change in procedure with a memorandum that suggested that approval of the deletion of the Mathematics Proficiency Test from the list of options available to students for mathematics competence demonstration was under the purview of the (no longer existent) General Education Committee and called for a "full review before final decisions are made" (Brewer, 1986:2). The Dean of Mathematics, Science, and Engineering, however, took the historically based position that the decision for such a change in procedure rested solely with the Department of Mathematics and no longer made the Mathematics Proficiency Test available to students. This practicum provided a contribution to the review of the attitudes of faculty and students concerning this issue as requested by the Dean of Instruction.

Requirements for the Associate Degree

As a means of placing the mathematics competence requirement in proper context, the minimum requirements for a student to be awarded an associate degree from a community college in California are briefly outlined below. These requirements are listed in Part VI of Title 5 of the California Administrative Code. The student shall demonstrate competence in reading, in written expression, and in mathematics. The student shall complete at least 60 semester units. This course work must include at least 18 semester units of study taken in a single discipline or related disciplines and at least 18 semester units in

general education including a minimum of three semester units in each of the following areas: natural sciences, social and behavioral sciences, humanities, English composition, and communication and analytical thinking. Courses fulfilling the communication and analytical thinking requirement included oral communication, mathematics, logic, statistics, computer languages and programming, and related topics (California Administrative Code, Section 55806).

The individual community colleges may define additional degree requirements if desired. Saddleback College defined the associate degree general education requirements to match the lower division general education course pattern for students transferring to the California State University system. Consequently, the only courses that satisfy the communication and analytical thinking requirement at Saddleback College are oral communication courses. Mathematics courses apply toward an associate degree only to meet the 18 units in a single discipline or to meet the mathematics competence requirement.

The California Administrative Code gives no guidelines for the level at which mathematics competency is to be demonstrated. This decision is left to the governing board of each college to determine for itself.

Review of the Literature

The Minimum Level of Mathematics Competence Recommended for Two-Year College Graduates

In January, 1978 the Mathematical Association of America Committee on the Undergraduate Program in Mathematics (CUPM) established a panel, hereafter referred to as the CUPM Panel or the Panel, to study

the question: "What mathematics should every graduate of an American college or university know?" (CUPM, 1982:266). The results of the Panel's study and their recommendations were presented in 1982. The Panel found that American colleges and universities are so diverse that it was not possible to describe either an approximately standard practice or an everywhere attainable goal (CUPM, 1982:267). The Panel suggested what it believed to be absolutely minimal mathematical competencies for all college graduates and encouraged colleges to go as far beyond these competencies as local conditions allowed. For two-year college students in terminal and vocational programs, competence in arithmetic and some ability to apply these concepts in everyday life was thought to be a reasonable level of mathematics proficiency. Two-year college graduates in university parallel curicula should be competent in arithmetic, elementary algebra, and elementary geometry. The Panel (CUPM, 1982:267) also felt these students should "understand and be able to use some elementary statistical ideas, to be aware of the place of mathematics in society generally, and to appreciate the nature and societal significance of computing."

In 1977 the Developmental Mathematics Curriculum Committee of the American Mathematical Association of Two-Year Colleges, hereafter referred to as the DMC Committee, established a five year plan that was to culminate in 1982 with a recommended policy of minimal mathematics standards for two-year college graduates (Dyer, 1980:18). A survey of two-year colleges was conducted in 1978 and 85 percent of the 207 responding colleges believed that some minimal mathematics competence requirement should exist (Dyer, 1980:18).

The 1981 Annual Report of the DMC Committee showed that no further work beyond the 1978 survey had been completed concerning the identification of minimal competencies in mathematics (Dyer, 1981:11). The minimal competency subcommittee expressed some concern as to the appropriateness of this effort by a committee whose main focus was developmental mathematics. It wondered if the issue should not be the concern of a broader based mathematical group. The DMC Committee established a new five year plan that was to culminate in 1986 with a position by the Association with respect to minimal mathematics competencies (Dyer, 1981:12). The literature contains no further reference to the work of the minimal competency subcommittee and it was thus assumed that the American Mathematical Association of Two-Year Colleges would not soon take a position on minimal competencies.

The Academic Senates of the California Community Colleges, the California State University, and the University of California, hereafter referred to as the Academic Senates, issued a joint statement concerning the competencies expected for baccalaureate level course work (Academic Senates, 1982). It was their position that students should possess those skills expected of someone who has successfully completed an intermediate algebra course (Academic Senates, 1982:15). This level of mathematics is the current measurement standard for baccalaureate applicable course work offered by the University of California (Saddleback College, 1986a:80). Beginning with the fall 1988 semester, competence in intermediate algebra will also be required of all students entering the California State University system (Reynolds, 1986:1). Combining this development in California higher education with the belief by the CUPM Panel that the

minimum competencies for two-year college students in university parallel curricula be the same as for four-year college students results in a recommendation of a competency level exceeding intermediate algebra. Material at this level would include: statistics, finite mathematics, trigonometry, and polynomial calculus.

The Board of Governors of the California Community Colleges, hereafter referred to as the Board, has also participated in the trend of recommending an increase in the mathematics competencies required for degree applicable courses. The Board has accepted staff recommendation that would place the minimum level of acceptable courses for the associate degree at elementary algebra (Board, 1985:8). This modification has not yet been approved by the State Legislature. Even if approved, this modification would not define the level of minimum mathematics competence required for the associate degree. Rather, it addresses only the acceptability of courses toward the required sixty units. This requirement is apart from the needed demonstration of competence in reading, in written expression, and in mathematics. If one assumes that this course standard should also be applied to the mathematics competence requirement, then it would be set at the elementary algebra level.

Recommended Methods for Student Demonstration of Mathematics Competence

Neither the California Administrative Code nor the Board of Governors of the California Community Colleges make any recommendations for the method to be used by a student to demonstrate mathematics competence (California Administrative Code, Section 55806 and Board, 1985). This decision is left to the individual colleges. The CUPM

Panel similarly recommended that the specific manner in which the minimum requirements are met should be left to the discretion of the colleges, because it will depend, not only on the requirements themselves, but also on local policies, traditions, and resources (CUPM, 1982:267).

The Academic Senates recommended that the determination of whether a student possesses adequate competencies in mathematics be made by a "pragmatic evaluation" (Academic Senates, 1982:16). The Academic Senates further defined the form of the evaluation to be an examination. "This evaluation shall take the form of a segment-wide examination developed by a California college or university system or an examination that meets state-wide standards in assessing the competencies specified." (Academic Senates, 1982:16)

This recommendation would be difficult for the California community colleges to adopt system-wide, because of the lack of a uniform agreement as to the minimum acceptable level of mathematics competence. If examinations are made available to students as a means of demonstrating competence in mathematics, the literature suggests these tests will be, most often, authored by a segment of the college faculty where the test is used. This appraisal is based on the large body of information in the literature dealing with mathematics assessment practices, since little reference is made to graduation competencies. Cohen (1985:57) suggests that there are many reported instances of faculties turning to "homemade placement tests" after dissatisfaction with nationally-normed tests or tests prepared and distributed by a national agency. Wood (1980:60), for example, found that American College Testing (ACT) test cut-off scores proved unreliable as a measure

of acquired algebraic skills at South Texas Junior College (Houston, Texas) and mused that the SAT scores would similarly be inadequate perhaps because "SAT stands for Scholastic Aptitude Test, not Scholastic Ambition Test. There is no defense against the resolute under achiever." (Wood, 1980:60).

Rounds and Anderson (1984) conducted a survey of entrance and placement tests used by the 106 California community colleges in 1982. Of the 99 respondents, 67 colleges used mathematics assessment. Only six test instruments, other that locally developed tests, were reported more than once. In all, seventeen tests other than local instruments were identified. Nearly forty percent of those colleges using mathematics assessment used local instruments. The next most frequently used instrument was the SCAT -Math Test with fifteen percent of the colleges involved (Rounds and Anderson, 1984:11).

Recommendations Concerning Mathematics Courses Offered External to the Mathematics Department

Mathematics courses offered external to the mathematics department of a college are recognized by the literature. The CUPM Panel (CUPM, 1982) made no mention of a restriction of mathematics courses to a particular discipline or department faculty. The Academic Senates (1982:17) acknowledged the existence of specialized courses in mathematics developed and taught by other departments to meet the needs of their majors. They recommended that "the mathematics department or appropriate faculty body within each institution" should certify the level of any mathematics course taught within that institution (Academic Senates, 1982:17).

The Board mentions these courses in their proposed modification to the California Administrative Code concerning degree applicable courses. The proposal stipulates that credit mathematics courses taught in departments other than mathematics must require the same entrance skills as elementary algebra (Board, 1985:2). This position, together with that of the Academic Senates, suggests that if courses are to be used to demonstrate mathematics competence, these courses need not be offered within the mathematics department. They must, however, carry the minimum prerequisites for a mathematics course used to satisfy this requirement.

The Need for Policy Review in the Face of the Changing Community College

The position of career or vocational programs in the California community college have changed significantly since Fresno City College opened in 1910 as the first junior college in California. Although the curriculum included courses for technical and vocational training, the dominant function of the early junior college was the provision of lower division college work, and for that the associate degree was awarded (Board, 1985:A-3). In the 1940's and early 1950's writers admonished junior colleges for "trying to imitate the four-year programs" and, in support of occupational studies, called upon the colleges to "offer courses close to the interest of the student, and suited to his abilities" (Starrack and Hughes, 1954:40). A major shift from transfer to occupational programs began in the second half of the 1960's (Cohen and Brawer, 1982:200). By the beginning of the 1980's occupational education had "become the major funtion in most community

colleges" (Cohen and Brawer, 1982:219). This century has thus seen occupational education move from a peripheral to a central position within the community colleges (Cohen and Brawer, 1982:xviii). Grede (1981:7) observed that "the growing occupational programs not only have changed in form and focus but have strongly influenced the culture and climate of post-secondary institutions, particularly community colleges." He claims that this orientation toward the world of work has caused the education programs to take forms very similar to the inservice training provided by business and industry for its employees. In this process, Grede (1981:7) feels general education becomes supportive to the career focus of the student rather than remaining the primary focus as when students sought preparation in the prerequisites for senior college specializations.

Grede's view that general education courses should aid a student's career focus is supported by many of the recommendations emanating from the 1984 Alfred P. Sloan Foundation sponsored conference entitled New Directions in Two-Year College Mathematics (Albers, 1985). It is a recommendation of the conference members that "mathematics courses in two-year colleges should be of immediate use to students and not be seen merely as preparation for distant goals. The material should be connected to real life" (Albers, 1985:373). Further it is a recommendation that

> entry-level courses for students who lack arithmetic skills should be organized around mathematical content new to these students (e.g. vocational mathematics) and should use approaches different from what they may have experience in school mathematics (Albers, 1985:373).

The need for college courses to support the immediate career goals of students is not accepted by all community college educators.

Although mindful of the job oriented interests of most community college students, Shaw (1983:5) believes educators are shirking their social responsibility if skills are provided without perspective, without a sense of ethics and human values. She feels community college educators must be mindful of the training needs of society and the educational needs of students. A balance must be found between the short-term business demands and long-term student needs (Shaw, 1983:9). She calls for educators to have sufficient courage to defend inclusion of English, mathematics, speech, and human development in programs that train students for the era of new technology.

The need for college students to be allowed to personally speak to the issues and participate in policy discussions by the college community was made clear in a recent Carnegie Foundation study. It is a Foundation recommendation that students be drawn into the governance of their own colleges and encouraged to not just become involved in serving the community, but to question its standards and ethics as well (Roark, 1986:I-26).

Summary of the Review of Literature and the Relationship to the Practicum

A student is required by law to demonstrate competence in mathematics before an associate degree can be awarded. The law, however, provides no guidelines for the level of mathematics at which this competence should be demonstrated, how this competence is to be demonstrated, or which segments of the college community should be given the responsibility for certifying this competence. Recent actions by the public college and university systems in California suggest a general

raising of mathematics requirements. The community college sector is probably moving to a minimum level of elementary algebra or its parallel. It is generally recognized that mathematics intensive courses exist external to the college mathematics department. The literature suggests that these courses should be treated as regular mathematics courses if adequately monitored by the mathematics department or other appropriate faculty body. In fact, community college mathematics educators suggest that regular mathematics courses should become more vocational in nature. This will better serve the well defined career focus of students and narrow the gap between courses offered internal and external to the college mathematics department.

The determination of the level of mathematics competence required of a student seeking the associate degree and the method of this demonstration is left to each individual community college. The literature indicates locally authored proficiency examinations are more popular that commerically produced tests among community college faculties. Such a local examination option was recently deleted at Saddleback College.

Because of the broad based changes in the college community and in the State-wide attitudes toward mathematics competence, a review of the current policy concerning demonstration of mathematics competence was required at Saddleback College. Because of the recognized existence of mathematics courses external to the mathematics department and the Carnegie Foundation call for student involvement in college governance, the review required the participation of students and faculty from a wide variety of disciplines. This practicum completed such a review.

Relationship of the Study to the Seminar in the Emergence of Higher Education in America

The curriculum issues noted above can be viewed as examples of the vocational study versus liberal arts controversy that has plagued or prodded higher education in America throughout its history. The exploration of this controversy was a major theme of the Emergence of Higher Education in America Seminar.

Chapter 3

PROCEDURES

Inventory of Current California Community College Practices

Collection of Data

To conduct an inventory of the current practicies used by the California community colleges that determine student competence in mathematics as required for the associate degree, the resources of the Saddleback College Counseling and Guidance Center were used. These resources included several hundred college catalogs as well as a microfiche collection of most American college and university catalogs. These resources provided access to the catalog of each of the 105 California community colleges. The edition of the catalogs varied slightly with availability and individual college publication practices, but in no case was a catalog for an academic year prior to 1985-1986 used for this study.

Each college catalog was researched individually for a description of the methods available to students for meeting the mathematics competence associate degree requirement. In all but ten catalogs, this information was clearly discernable. The catalogs for the nine colleges of the Los Angeles Community College District were essentially identical documents provided for the college by the District. In each catalog the student was referred to the college counseling services department for the specific means of meeting the mathematics competence requirement

at that particular college. Citrus College (Glendora, CA) similarly directed students to the Counseling Department for the list of courses that would meet this associate degree requirement.

To complete the inventory, a letter and a questionnaire were sent to the mathematics department chair of Citrus College and each of the member colleges of the Los Angeles Community College District. A request was made for specific information concerning the means available to the student for meeting the associate degree requirement of mathematics competence. Copies of the letter and questionnaire were placed in Appendix A. Responses were received from seven of these ten colleges.

The inventory of current practices was thus based on the procedures of 102 of the 105 California community colleges. This corresponds to a prepresentation of 97 percent of the community colleges in California.

Treatment of the Data

Based on the various options available to students for meeting the mathematics competence requirement, nine distinct categories were identified. Each college was then listed together with others using similar policies.

Measurement of Support for Current Practices at Saddleback College

An opinion survey was conducted during the first two weeks of the 1986 fall semester to determine the level of College community support for current practices relating to the student demonstration of mathematics competence for the associate degree. All full-time faculty and

selected groups of students were asked to participate in this survey. These questionnaire responses formed the basis for the results and conclusions concerning this area of the study.

Questionnaire Development

Following a cursory review of 37 community college catalogs, a set of common methods used to demonstrate mathematics competence was created. These methods, together with some alternative methods that provided a sense of continuity to the list of options available to students, were identified as items on the preliminary questionnaire form placed in Appendix B. In an effort to keep the number of questionnaire alternatives to a minimum and because, according to estimates by the Office of Admissions and Records, less than five percent of associate degree graduates at Saddleback College use the option of nationally standardized examinations to demonstrate mathematics competence, the options that were not simple additions to the current practice did not include these examinations. The option of standardized examinations was to be added under "other", if desired by a questionnaire respondent.

The questionnaire was reviewed by the Assistant Division Dean of the Mathematics, Science, and Engineering Division. Following this review, three changes were made to the questionnaire. The two questionnaire statements were numbered to better impress upon the respondents that, in spite of its appearance, there were only two responses sought. The wording for statement two was made more specific and an additional response option was added to question two. This questionnaire version was placed in Appendix C. The additional response option to question two was designated "E."

This questionnaire was reviewed by the member of the counseling staff who serves as the College Articulation Officer. He felt that the response options were sufficiently exhaustive and recommended no changes to the questionnaire.

An elementary algebra class taught by a full-time instructor from a Saddleback College department other than Mathematics was selected for a survey pilot during the 1986 summer term. This class was selected because students from a wide variety of majors take elementary algebra. If some mathematical jargon or other points of confusion had crept into the questionnaire, it was felt these students would experience some difficulty and identify the needed changes. Also, the instructor was a member of the faculty group to be surveyed and not biased by the previous discussions on this issue within the Mathematics Department. The survey pilot was run in August, 1986. Nine of the twelve students active in the course at that time completed the questionnaire. They experienced no difficulty identifying their major educational interest or selecting a response to statement two. No additional responses to those already listed were suggested. Similarly, the instructor had no difficulty completing the questionnaire, but he added the comment that students should not decide proficiency criteria. This response suggested that the questionnaire cover letter to the faculty should clearly and carefully explain the advisory nature of any survey results.

Following this review and pilot process, the questionnaire form placed in Appendix C was considered ready for administration. A copy of the cover letter attached to each questionnaire sent to faculty members

for their response was place in Appendix D. A copy of the cover letter to instructors of classes selected for participation in the student opinion survey was placed in Appendix E.

Population

The population for this study had a faculty component and a student component. The faculty component was composed of all 204 full-time Saddleback College faculty members and division deans not on sabbatical leave for the 1986 fall semester. The student component was composed of all students enrolled in a course that started at the beginning of the semester and that satisfied the English composition or communication and analytical thinking general education requirements for the associate degree. These courses were English 1A, English 200, English 109, Speech 1, Speech 200, and Management 102/Office Information Systems 112 (Saddleback College, 1986a:23). The College offered 74 sections of these classes for the 1986 fall semester (Saddleback College, 1986b:33,34,47,67). Data available from the Office of the Dean of Instruction showed that the student enrollment in these 74 sections on the first day of instruction for the 1986 fall semester was 1863.

Sample

Because of its rather small size, the entire population was chosen for the sample. Ultimately 843 questionnaires were completed by students and returned from 43 class sections with first day enrollment of 1070. Thus approximately 57 percent of the students in the sample were actually given the opportunity to participate in the survey. The response rate from this group was approximately 79 percent. Ultimately

116 completed faculty questionnaires were returned for analysis. Since 204 faculty questionnaires were distributed, the response rate was approximately 57 percent.

Data Collection

One week prior to the beginning of instruction for the 1986 fall semester, a cover letter as shown in Appendix E and a set of questionnaires, in which the number of questionnaire copies exceeded the maximum class size by five, was sent through the College mail system to each instructor of the courses selected for the student survey sample. Through the cover letter, these instructors were asked to conduct the survey in their class and return the questionnaire for analysis.

At the beginning of the third week of instruction, each member of the faculty sample was sent, through the College mail system, a cover letter as shown in Appendix D and a questionnaire. Through the cover letter, they were asked to participate in the survey and return a completed questionnaire for analysis.

Assumptions of the Investigation

1. It was assumed that the college catalogs accurately described the methods available to students for demonstrating mathematics competence.
2. It was assumed that the class enrollments on the first day of instruction reasonably approximated the number of students asked to complete the questionnaire by those instructors who conducted the survey.

3. It was assumed that the number of students enrolled in a class on the first day of instruction reasonably approximated the actual number of attending students.
4. It was assumed that respondents gave their true opinion.
5. It was assumed that the student population chosen adequately represented the views of all Saddleback College students concerning the associate degree requirements.
6. It was assumed that the students in the sample for the 1986 fall semester had similar attitudes to students seeking an associate degree in subsequent semesters.

Limitations of the Investigation

1. The inventory results were limited to community colleges in California.
2. The faculty survey results were limited to the full-time faculty and division deans of Saddleback College with assignments on the College campus during the 1986 fall semester.
3. The student survey results were limited to Saddleback College students likely to be pursuing the general education requirements for college or university transfer, for the associate degree, or both.

Definition of Terms

1. Occupational Course -- A course that is intended to develop the skills and related knowledge needed for job performance, is part of the course sequence of an occupational program offered by the college, and is designed primarily for job preparation or job

prepartion or job upgrading or updating and not for general education purposes (Cohen and Brawer, 1982:203).

2. Full-time Instructor -- A regular certificated employee of Saddleback College during the 1986 fall semester.
3. Part-time Instructor -- A certificated employee of Saddleback College who was not a regular employee and was assigned to teach at least one class during the 1986 fall semester.
4. Day Class -- A course section with a meeting time that started before 4 p.m.
5. Night Class -- A course section with a meeting time that started at or after 4 p.m.

Differences Between the Final Practicum Report and the Proposal

A few changes from the practicum proposal were included in the final practicum report. The title was changed to more clearly reflect the purpose of the study. The questionnaire was modified slightly as a result of faculty review and pilot execution. The data analysis involved a post-stratified sample process with weighting factors applied in an effort to compensate for the irregular and sometimes low survey response rates.

Chapter 4

RESULTS

The State-wide Inventory of Mathematics Competence Demonstration Practices

The methods available to students enrolled in the community colleges in California for demonstration of competence in mathematics applicable to the minimum requirements for the associate degree fell into nine categories. The two most frequently encountered categories gave the student the option of completing a locally designed and administered proficiency test or completing a course. The most frequently encountered category, with 30 subscribing colleges, allowed courses in departments other than mathematics as well as regular departmental mathematics courses to certify mathematics competence. The next most frequent category, with 29 participating colleges, required the applicable courses to be taught by the mathematics department.

The Saddleback College current practice of using completion of a course offered within the Mathematics Department or achievement of an acceptable score on a commerically produced, standardized test, placed it in a category with six other California community colleges. The number of colleges with practices that placed them in each of the nine categories was placed in Table 1. A list of the colleges in each of the nine categories was placed in Appendix F.

Table 1

Categories of Demonstration Practices
for Mathematics Competence

Category	Description of Options Available to Students to Meet the Requirement	Number of Colleges
1	* Locally produced mathematics proficiency test * Completion of a course offered by the Mathematics Department or other disciplines	30
2	* Locally produced mathematics proficiency test * Completion of a course offered by the Mathematics Department	29
3	* Completion of a course offered by the Mathematics Department or other disciplines	11
4	* Commercially produced, standardized mathematics test * Completion of a course offered by the Mathematics Department or other disciplines	7
5	* Commercially produced, standardized mathematics test * Completion of a course offered by the Mathematics Department	6
6	* Locally produced mathematics proficiency test * Commercially produced, standardized mathematics test * Completion of a course offered by the Mathematics Department or other disciplines	6

Table 1 (continued)

Category	Description of Options Available to Students to Meet the Requirement	Number of Colleges
7	* Locally produced mathematics proficiency test * Commercially produced, standardized mathematics test * Completion of a course offered by the Mathematics Department	5
8	* Completion of a course offered by the Mathematics Department	4
9	* Mathematics examination only. May be either commercially or locally produced or both	4
	Number of colleges that did not respond	3
	TOTAL	105

The single most often offered option for demonstrating mathematics competence was completion of a course taught within the mathematics department. There were 98 colleges using this option. This represented 93 percent of the colleges in the California system. This option was followed in frequency by the use of a locally produced proficiency test. The number of colleges offering this alternative was 72 and represented 69 percent of the community college system. The complete distribution of alternatives was placed in Table 2.

Table 2

Frequency of Individual Options Available to Students for Demonstration of Mathematics Competence

Definition of the Demonstration Option	Number of Colleges	Percent N = 105
1. Completion of a course offered by the Mathematics Department	98	93%
2. A satisfactory score on a locally produced proficiency test	72	69%
3. Completion of a course offered by a discipline other than mathematics	54	51%
4. A satisfactory score on a commercially produced, standardized mathematics test	26	25%
5. Completion of a particular mathematics course while the student was attending high school	7	7%

The Level of Faculty Support for Exclusivity of Mathematics Department Determination of Student Competence in Mathematics

Treatment of the Data

The distribution of responses to questionnaire item two stratified by instructional divisions as Saddleback College was placed in Appendix G. The response rate, taking the faculty as a single unit of 204 people, was 57 percent. This rate of response was not uniformly distributed over the various instructional divisions. The response rate ranged from a low of 21 percent for the Fine Arts and Communication Division to a high of 79 percent for the Division of Technology and Applied Science. The largest number of responses from a single division, 23, came from the resident division of the Mathematics Department. Because of this variation in questionnaire response patterns, a weighting factor was calculated for each division that when applied to the questionnaire of each respondent in a specific division caused the total questionnaire responses from that division to equal the number of faculty members in that division. For example, if a division had 20 faculty members and only 10 responded to the survey, each response was multiplied by 2. Consequently, each actual questionnaire response counted as two responses from that division in the manner selected by the actual respondent. Using this procedure gave each instructional division a 100 percent response rate. The divisional weighting factors and the distribution of weighted faculty questionnaire responses stratified by instructional division was placed in Appendix H.

All faculty members who gave A, B, F, or H as their response to questionnaire item two (see Appendix C for a copy of the questionnaire) were considered supportive of the exclusivity of the Mathematics Department in determining student competence in mathematics. Only five of the 116 actual respondents chose item J, "Other." Four of these were from the Division of Mathematics, Science, and Engineering. They suggested a modification to option A that would allow only completion of certain mathematics courses to certify mathematics competence. The remaining J respondent was from the Liberal Arts Division and suggested a modification to F that would allow a satisfactory score on a commercially produced, standardized mathematics examination to certify mathematics competence. All five faculty members who chose response J were considered supportive of the exclusivity of the Mathematics Department in determining student competence in mathematics.

Results

Based on the weighted questionnaire responses of 116 faculty members from the sample (and population) of 204, 73 percent of the Saddleback College faculty chose questionnaire responses supportive of the exclusivity of the Mathematics Department in determining student competence in mathematics.

Almost the entire faculty, in fact 97 percent, felt completion of a course offered by the Mathematics Department should be an option available to students for demonstration of mathematics competence. A satisfactory score on a commercially produced, standardized mathematics test was desired as an option by 89 percent of the faculty, while 61 percent desired the availability of a locally produced proficiency test.

Completion of a course offered by a discipline other that mathematics was desired by 20 percent of the faculty of Saddleback College.

The Level of Student Support for Exclusivity of Mathematics Department Determination of Student Competence in Mathematics

Treatment of the Data

The extent of faculty conduction of the student survey was not uniformly spread over the sample. In multisection courses, part-time instructors were often more likely to return student questionnaires for analysis than were full-time instructors. For example, while the survey was run in four of the seven sections (57 percent) of Speech 1 taught by part-time instructors, the survey was run in six of the 16 sections (38 percent) of the Speech 1 sections taught by full-time instructors. This resulted in responses from 60 percent (i.e. 3 of 5) of the night class sections and 39 percent (i.e. 7 of 18) of the day class sections.

To guard against the development of a nonrepresentative student sample due to a nonrandom faculty response pattern, the student questionnaires were stratified according to course and the time of the day the class was scheduled. Day classes were considered to be those that began before 4 p.m. Night classes were considered to be those that began at 4 p.m. or after. The resulting eleven strata were: English 1A -- day, English 1A -- night, English 200 -- day, English 200 -- night, English 109 (only one section existed), Speech 1 -- day, Speech 1 -- night, Speech 200 -- day, Speech 200 -- night, Management 102 -- day, Management 102 -- night. Weighting factors were determined that, when applied to each questionnaire in a strata, gave a total number of

responses equal to the number of students enrolled in that strata on the first day of instruction for the 1986 fall semester. The distribution of weighted student responses to questionnaire items one and two was placed in Appendix I.

Results

Based on the weighted questionnaire responses of 843 students from the estimated 1070 students in the sample of 1863 who were actually given the questionnaire, 63 percent of the students chose questionnaire responses supportive of the exclusivity of the Mathematics Department in determining student competence in mathematics.

Almost the entire student sample, in fact 96 percent, felt completion of a course offered by the Mathematics Department should be an option available to students to demonstrate mathematics competence. A satisfactory score on a commercially produced, standardized mathematics test was desired as an option by 86 percent of the students, while 43 percent desired the availability of a locally produced proficiency test. Completion of a course offered by a discipline other than mathematics was desired as an option by 29 percent of the students of Saddleback College.

Chapter 5

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

Discussion and Implications

The inventory of current practices of California community colleges dealing with student demonstration of mathematics competence was successfully completed. Only three of the 105 colleges in the system (less than 3 percent) were left unclassified. Although the combination of options available to students on the college campuses separated into 9 distinct classifications, each of the following options was available at a majority of the colleges: (1) Completion of a course offered by the mathematics department, (2) A satisfactory score on a locally produced proficiency test, (3) Completion of a course offered by a discipline other than mathematics. The preference for locally designed tests, rather than commercially produced instruments, was consistent with the findings of Rounds and Anderson (1984:11) that locally designed mathematics examinations were most often used for assessment tasks in California community colleges.

The lack of a locally developed mathematics test available for use by students to demonstrate mathematics competence placed Saddleback College in a group of only 28 percent of the colleges without such an examination. Of the 87 colleges that allowed demonstration of competence by examination, only 13 (15 percent) did not provide a locally developed examination as an option.

The lack of a locally developed examination also was counter to the desires of the majority of the full-time faculty at Saddleback College and to the desires of 43 percent of the students at the College. The strength of this interest in the existence of a locally produced proficiency examination suggested a reconsideration of current practice by the Mathematics Department.

More that 70 percent of the Saddleback College full-time faculty and 63 percent of the student sample were supportive of the exclusivity of the Mathematics Department in determining student competence in mathematics. Since this support exceeded the 60 percent level for both groups, there was considered to be a high level of College support for this position of the Mathematics Department. This position placed Saddleback College in the company of 48 other colleges (46 percent of the colleges in the California system) that similarly restricted demonstration of mathematics competence to means under the direction of the mathematics department.

Recommendations

It is recommended that the Mathematics Department consider the development of a mathematics proficiency examination and allow its use by students to demonstrate mathematics competence as required for the associate degree. This recommendation is made because of the broad based College community interest in such an examination.

It is recommended that courses outside of the Mathematics Department offerings not be used by students to demonstrate mathematics competence. This recommendation is made because of the high level

of support found for the exclusive position of the Mathematics Department in certification of mathematics competence.

Potential for Positive Change

As a result of this study, the high level of College community support for the exclusive position of the Mathematics Department to certify student mathematics competence was documented. The high frequency of this position within the California community college system was also demonstrated. These results should remove anxiety from the faculty within the Department concerning this issue. The dissipation of this anxiety should promote the further development of a collegial relationship between Department members and those representing the many different interests of the College.

BIBLIOGRAPHY

Academic Senates of the California Community Colleges, the California State University, and the University of California (Academic Senates). Statements on Preparation in English and Mathematics: Competencies Expected of Entering Freshman and Remedial and Baccalaureate-level Course Work. ERIC ED 222 235, 1982.

Albers, Donald J. "New Directions in Two-Year College Mathematics." Mathematics Teacher, 78:373-375. May, 1985.

Bartlett, Ryburn D. Deletion of Math Proficiency Exam. Saddleback College Memorandum. July 15, 1986.

Board of Governors of the California Community Colleges (Board), Actions on Associate Degree Applicable Course Standards and Remediation Policies. May 30-31, 1985.

Brewer, Everett. Math Proficiency Exam: AA/AS Degree Requirements. Saddleback College Memorandum. July 22, 1986.

California, State of. California Administrative Code. Title V (Education), Part VI, Section 55806. Sacramento: Office of Administrative Hearings. Department of General Services.

Cohen, Arthur M. "Mathematical Instruction at the Two-Year College: An ERIC Review." Community College Review, 12:54-61. Spring, 1985.

Cohen, Arthur M. and Florence B. Brawer. The American Community College. San Francisco: Jossey-Bass Publishers, 1982.

Committee of the Undergraduate Program in Mathematics (CUPM). "Minimal Mathematical Competencies for College Graduates: The Report of a CUPM Panel." The American Mathematical Monthly, 89:266-272. April, 1982.

Dyer, Patricia A. American Mathematical Association of Two-Year Colleges, Developmental Mathematics Curriculum Committee. Annual Report. ERIC ED 196 654, 1980.

Dyer, Patricia A. American Mathematical Association of Two-Year Colleges, Developmental Mathematics Curriculum Committee. Annual Report. ERIC ED 208 924, 1981.

Grede, John F. "Changing Form and Focus of Occupational Education." New Directions for Community Colleges, 33:1-10. March, 1981.

Reynolds, W. Ann. "An Open Letter from Chanellor W. Ann Reynolds to Those Interested in CSU Admissions Policies." CSU School and College Review, 4:1-5. April, 1986.

Roark, Anne C. "Colleges Take Scolding From Carnegie Panel." Los Angeles Times, I-1. November 2, 1986.

Rounds, Jeanine C. and Dan Anderson. Tests in Use in California Community Colleges: Standardized Tests Most Used for Placement in English, Reading, ESL, and Math. ERIC ED 250 037, 1984.

Saddleback Community College District. Saddleback College and Irvine Valley College 1986-1987 Catalog. Mission Viejo, California: Saddleback Community College District, 1986a.

Saddleback Community College District. Saddleback College and Irvine Valley College Fall 1986 Schedule of Classes. Mission Viejo, California: Saddleback Community College District, 1986b.

Shaw, Ruth G. The Humanities in an Era of New Technology: Variations on a Theme. ERIC ED 243 515, 1983.

Starrack, J.A. and R.M. Hughes. The Community College in the United States. Ames: Iowa State College Press, 1954.

Wood, June P. "Mathematics Placement Testing." New Directions for Community Colleges, 31:59-64. Fall, 1980.

APPENDIX A

QUESTIONNAIRE AND COVER LETTER SENT TO
COLLEGE MATHEMATICS DEPARTMENT CHAIRS

Saddleback College

28000 Marguerite Parkway • Mission Viejo, CA 92692 • (714) 582-4500

Survey of Mathematics Competency Requirements for the Associates Degree

In each case, please circle the most appropriate response.

Students may certify their competence in mathematics by:

YES NO 1. Achieving a passing score on a locally administered proficiency test.

YES NO 2. Achieving a passing score on a nationally standardized college mathematics examination such as the SAT, ACT, SCAT, etc.

a) If your answer was YES, please list the specific examinations and passing scores used.

_____

YES NO 3. Passing a course taught by the Mathematics Department.

a) If your answer was YES, please indicate the minimum level of mathematics acceptable:

Arithmetic Beginning Algebra Geometry Intermediate Algebra

Other: (please specify) _____

YES NO 4. Passing a course taught by a department other than Mathematics.

a) If your answer was YES, please specify the departments or disciplines which can also offer mathematics certification:

_____

YES NO 5. Completion of an appropriate course in high school.

a) If your answer was YES, please indicate the accepted courses.

Algebra I Geometry Algebra II Trigonometry

Other: (please specify) _____

6. Please describe below any other means of certification available to your students.

BOARD OF TRUSTEES: John C. Connolly, Shirley Gellatly, Joan J. Hueter, Marcia Milchiker, Robert L. Moore, Iris Swanson, Harriett S. Walther
Dr. Richard Sneed, Chancellor

Saddleback College

28000 Marguerite Parkway • Mission Viejo, CA 92692 • (714) 582-4500

October 20, 1986

Dear Colleague:

The Mathematics Department at Saddleback College is conducting a study of the California Community Colleges to determine the methods used to certify "student . . . competence . . . in mathematics" (Title 5, Chapter 8, Section 51624) for the Associates Degree. This information will be used during the forthcoming review of our general education and competency requirements for the Associates Degree by the College's General Education Committee.

After reading your College's catalog description, a few questions remained in our minds concerning your method of certification. We would be most appreciative if you could respond to the attached statements and return them to us by November 5, 1986 in the enclosed preaddressed and postage paid envelope.

Sincerely,

Steve Sworder,
Mathematics Instructor

BOARD OF TRUSTEES: John C. Connolly, Shirley Gellatly, Joan J. Hueter, Marcia Milchiker, Robert L. Moore, Iris Swanson, Harriett S. Walther
Dr. Richard Sneed, Chancellor

APPENDIX B

PRELIMINARY QUESTIONNAIRE

Saddleback College MATHEMATICS DEPARTMENT

We are reviewing the mathematics proficiency portion of the general education requirements for the associate degree. This requirement is currently satisfied as shown in the box below:

> A satisfactory score on either the ACT, SAT, SCAT or completion of a mathematics course offered within the Mathematics Department.

We would very much like to know what alternatives, if any, you would like available for meeting this mathematics proficiency requirement and hope you will take a moment to complete the following questionnaire.

Thank you,
S.C. Sworder
Mathematics Department

In which <u>one</u> of the following Divisions does your primary educational interest lie? Please circle the letter next to only <u>one</u> of the following Divisions.

A) Business Science

B) Fine Arts and Communications

C) Liberal Arts

D) Social Science

E) Mathematics, Science and Engineering

F) Physical Education, Recreation, Health and Athletics

G) Health Sciences and Human Services

H) Technology and Applied Science

I) Undecided

J) Other (please specify): _____

Please circle the letter next to the form of the general education mathematics proficiency requirement you think is most desirable. Please circle only <u>one</u>.

A) Keep it exactly as stated in the box above.

B) Keep the contents of the box above, but add the option of an examination written by the Saddleback College Mathematics Department.

C) Keep the contents of the box above, but add the option of an examination written as a cooperative effort of all concerned departments (for example: business, counseling, nursing, mathematics, electronics, etc.)

D) Keep the contents of the box above, but allow courses in other departments (for example: business, electronics, nursing, etc.) to also satisfy the requirement.

E) <u>Instead</u> of the current form (see the contents of the box above), only a satisfactory score on an examination written by the Mathematics Department should meet the mathematics proficiency requirement. <u>No</u> courses should meet this requirement.

F) <u>Instead</u> of the current form (see the contents of the box above), only a satisfactory score on an examination written as a cooperative effort of all concerned departments (for example: business, counseling, nursing, mathematics, etc.) should meet the mathematics proficiency requirement. <u>No</u> courses should meet this requirement.

G) <u>Instead</u> of the current form (see the contents of the box above), only completion of a course offered within the Mathematics Department should meet this requirement. <u>No</u> examination should meet this requirement.

H) <u>Instead</u> of the current form (see the contents of the box above), only completion of an appropriate course offered within one of the concerned departments (for example: business, chemistry, electronics, mathematics, nursing, etc.) should meet this requirement. <u>No</u> examination should meet this requirement.

I) Other (please specify in the space below):

APPENDIX C

QUESTIONNAIRE USED FOR THE SADDLEBACK COLLEGE SURVEY

Saddleback College MATHEMATICS DEPARTMENT

We are reviewing the mathematics proficiency portion of the general education requirements for the associate degree. This requirement is currently satisfied as shown in the box below:

> A satisfactory score on either the ACT, SAT, SCAT or completion of a mathematics course offered within the Mathematics Department.

We would very much like to know what alternatives, if any, you would like available for meeting this mathematics proficiency requirement and hope you will take a moment to respond to the two questions below.

Thank you,
S.C. Sworder
Mathematics Department

1. In which <u>one</u> of the following Divisions does your primary educational interest lie? Please circle the letter next to only <u>one</u> of the following Divisions.

   A) Business Science
   B) Fine Arts and Communications
   C) Liberal Arts
   D) Social Science
   E) Mathematics, Science and Engineering
   F) Physical Education, Recreation, Health and Athletics
   G) Health Sciences and Human Services
   H) Technology and Applied Science
   I) Undecided
   J) Other (please specify): _____

2. How should the general education mathematics proficiency requirement be satisfied? Please circle the letter below that is next to the best answer to this question. Please circle only <u>one</u> letter.

   A) Keep it exactly as stated in the box above.

   B) Keep the contents of the box above, but add the option of an examination written by the Saddleback College Mathematics Department.

   C) Keep the contents of the box above, but add the option of an examination written as a cooperative effort of all concerned departments (for example: business, counseling, nursing, mathematics, electronics, etc.)

   D) Keep the contents of the box above, but allow courses in other departments (for example: business, electronics, nursing, etc.) to also satisfy the requirement.

   E) Keep the contents of the box above, but allow appropriate courses in other departments (for example: business, electronics, nursing, etc.) to also satisfy the requirement. Also, add the option of an examination written as a cooperative effort of all concerned departments (for example: business, counseling, nursing, mathematics, electronics, etc.).

   F) <u>Instead</u> of the current form (see the contents of the box above), only a satisfactory score on an examination written by the Mathematics Department should meet the mathematics proficiency requirement. <u>No</u> courses should meet this requirement.

   G) <u>Instead</u> of the current form (see the contents of the box above), only a satisfactory score on an examination written as a cooperative effort of all concerned departments (for example: business, counseling, nursing, mathematics, etc.) should meet the mathematics proficiency requirement. <u>No</u> courses should meet this requirement.

   H) <u>Instead</u> of the current form (see the contents of the box above), only completion of a course offered within the Mathematics Department should meet this requirement. <u>No</u> examination should meet this requirement.

   I) <u>Instead</u> of the current form (see the contents of the box above), only completion of an appropriate course offered within one of the concerned departments (for example: business, chemistry, electronics, mathematics, nursing, etc.) should meet this requirement. <u>No</u> examination should meet this requirement.

   J) Other (please describe using the reverse side of this questionnaire).

APPENDIX D

FACULTY SURVEY QUESTIONNAIRE
COVER LETTER

Saddleback College

MEMORANDUM

September 8, 1986

Dear Professor

I am trying to identify the methods of satisfying the mathematics proficiency portion of the general education requirement for the associate degree that are preferred by the faculty and students of Saddleback College. Consequently, your opinion is of great importance to our study and I am hoping you will do me the great favor of completing the attached questionnaire. It only has two questions and should not take too long. If you do not wish to give your opinion or have no opinion on this subject, please signify this by simply drawing a line over the questionnaire.

When you have finished with the questionnaire, please return it to me by campus mail or leave a phone message at #4820 and I will retrieve it at your convenience.

Thank you for your help.

Steve Sworder
Mathematics Department
Saddleback College

APPENDIX E

COVER LETTER FOR QUESTIONNAIRE PACKETS SENT
TO INSTRUCTORS OF CLASSES SELECTED
FOR THE STUDENT SURVEY

Saddleback College

MEMORANDUM

August 18, 1986

Dear Professor

I am trying to identify the methods of satisfying the mathematics proficiency portion of the general education requirements for the associate degree that are preferred by the students and faculty of Saddleback College. To measure student opinion, a survey is being conducted of all students enrolled in a general education "Area A -- Communication Skills and Critical Thinking" course for the Fall 1986 semester. Your class:

is such an "Area A" course and I am hoping you will do me the great favor of conducting this survey in your class. There are only two questions and it should not take too long for the students to respond to the questionnaire.

If you are able to conduct this survey, would you please return both completed and extra questionnaires to me. If some students do not wish to participate, would you ask them just to draw a line through the questionnaire and include these in the return package also.

Sincerely,

Steve Sworder
Mathematics Department
Saddleback College

APPENDIX F

COMPLETE LIST OF COLLEGES PARTICIPATING IN EACH
CATEGORY OF MATHEMATICS COMPETENCE
DEMONSTRATION PRACTICE

COMPLETE LIST OF COLLEGES PARTICIPATING IN EACH
CATEGORY OF MATHEMATICS COMPETENCE
DEMONSTRATION PRACTICE

Category 1

Description of Options Available to Students to Meet the Requirement:

* Locally produced mathematics proficiency test
* Completion of a course offered by the Mathematics Department or other disciplines

Colleges that Subscribed to this Set of Options:

1. American River College
2. Canada College
3. Chabot College
4. City College of San Francisco
5. College of the Redwoods
6. College of the Sequoias
7. Compton Community College
8. Contra Costa College
9. Cuyamaca College
10. Cypress College
11. El Camino College
12. Foothill College
13. Fresno City College
14. Fullerton College
15. Golden West College
16. Hartnell College
17. Lassen College
18. Mendocino College
19. Mt. San Antonio College
20. Orange Coast College
21. Pasadena City College
22. Rio Hondo College
23. Sacramento City College
24. San Bernardino Valley College
25. San Jose City College
26. Santa Rosa Junior College
27. Skyline College
28. Southwestern College
29. Taft College
30. Yuba College

Category 2

Description of Options Available to Students to Meet the Requirement:

* Locally produced mathematics proficiency test
* Completion of a course offered by the Mathematics Department

Colleges that Subscribed to this Set of Options:

1. Allan Hancock College
2. Cerritos College
3. Coastline Community College
4. College of the Canyons
5. College of the Desert
6. Consumnes College
7. Crafton Hills College
8. Cuesta College
16. Marin Community College
17. Mira Costa College
18. Mission College
19. Modesto Junior College
20. Moorpark College
21. Mt. San Jacinto College
22. Ohlone Collge
23. Oxnard College

Category 2 (continued)

9. Evergreen Valley College
10. Feather River College
11. Glendale Community College
12. Imperial Valley College
13. Long Beach City College
14. Los Medanos College
15. Los Angeles Trade-Technical College
24. Porterville College
25. Riverside City College
26. Santa Barbara City College
27. Santa Monica College
28. Ventura College
29. West Valley College

Category 3

Description of Options Available to Students to Meet the Requirement:

* Completion of a course offered by the Mathematics Department or other disciplines

Colleges that Subscribed to this Option:

1. Barstow College
2. Chaffey College
3. College of Alameda
4. Columbia College
5. Lake Tahoe Community College
6. Palo Verde College
7. San Diego City College
8. San Diego Mesa College
9. San Diego Miramar College
10. Victor Valley Community College
11. Vista College

Category 4

Description of Options Available to Students to Meet the Requirement:

* Commercially produced, standardized mathematics test
* Completion of a course offered by the Mathematics Department or other disciplines

Colleges that Subscribed to this Set of Options:

1. Cabrillo College
2. Diablo Valley College
3. Laney College
4. Napa Valley College
5. San Joaquin Delta College
6. Shasta College
7. Sierra College

Category 5

Description of Options Available to Students to Meet the Requirement:

* Commercially produced, standardized mathematics test
* Completion of a course offered by the Mathematics Department

Category 5 (continued)

Colleges that Subscribed to this Set of Options:

1. East Los Angeles College
2. Irvine Valley College
3. Los Angeles Harbor College
4. Los Angeles Southwest College
5. Monterey Peninsula College
6. Saddleback College

Category 6

Description of Options Available to Students to Meet the Requirement:

* Locally produced mathematics proficiency test
* Commercially produced, standardized mathematics test
* Completion of a course offered by the Mathematics Department or other disciplines

Colleges that Subscribed to this Set of Options:

1. Antelope Valley College
2. College of San Mateo
3. De Anza College
4. Kings River Community College
5. Rancho Santiago College
6. Solano Community College

Category 7

Description of Options Available to Students to Meet the Requirement:

* Locally produced mathematics proficiency test
* Commercially produced, standardized mathematics test
* Completion of a course offered by the Mathematics Department

Colleges that Subscribed to this Set of Options:

1. Butte College
2. Citrus College
3. College of the Siskiyous
4. Los Angeles Valley College
5. Palomar College

Category 8

Description of Options Available to Students to Meet the Requirement:

* Completion of a course offered by the Mathematics Department

Colleges that Subscribed to this Option:

1. Bakersfield College
2. Cerro Coso Community College
3. Grossmont College
4. Los Angeles City College

Category 9

Description of Options Available to Students to Meet the Requirement:

* Mathematics examination only. May be either commercially or locally produced or both

Colleges that Subscribed to this Option:

1. Galivan College
2. Merced College
3. Merritt College
4. West Hills College

Unclassified

Colleges for which insufficient information existed to select their proper category placement:

1. Los Angeles Mission College
2. Los Angeles Pierce College
3. West Los Angeles College

APPENDIX G

DISTRIBUTION OF ACTUAL FACULTY QUESTIONNAIRE RESPONSES
STRATIFIED BY INSTRUCTIONAL DIVISION

Table 3

Distribution of Actual Faculty Questionnaire Responses
Stratified by Instructional Division

Instructional Division	Questionnaire Item Two Responses											Total Responses	Total No. of Faculty	Response Rate, %
	A	B	C	D	E	F	G	H	I	J1	J2			
Business Science	2	2	0	3	5	1	0	1	0	0	0	14	20	70.0%
Counseling	2	6	0	0	4	0	0	0	0	0	0	12	19	63.2%
Fine Arts	1	3	0	0	0	0	0	1	0	0	0	5	24	20.8%
Health Science	8	1	1	1	1	0	0	0	0	0	0	12	19	63.2%
Learning Resources	1	3	1	0	1	0	0	0	0	0	0	6	9	66.7%
Liberal Arts	1	4	1	0	3	1	0	0	0	1	0	11	24	45.8%
Math., Science	5	11	1	0	0	0	0	2	0	4	0	23	33	69.7%
Physical Education	2	2	2	1	0	0	0	0	0	0	0	7	16	43.8%
Social Science	4	5	0	0	0	1	0	0	0	0	0	10	19	52.6%
Technology	3	0	3	3	5	0	1	0	0	0	0	15	19	78.9%
Emeritus Institute	1	0	0	0	0	0	0	0	0	0	0	1	2	50.0%

Table 3 (continued)

	Questionnaire Item Two Responses													
	A	B	C	D	E	F	G	H	I	J1	J2	Total Responses	Total No. of Faculty	Response Rate, %
Total Number of Responses	30	37	9	8	19	3	1	4	0	5	0	116	204	56.9%
Percent of Responses N = 116	26%	32%	8%	7%	16%	3%	1%	4%	0%	4%	0%			

Note: J1 refers to "other" responses supportive of Mathematics Department exclusivity
J2 refers to "other" responses not supportive of Mathematics Department exclusivity

APPENDIX H

DISTRIBUTION OF WEIGHTED FACULTY QUESTIONNAIRE RESPONSES
STRATIFIED BY INSTRUCTIONAL DIVISION

Table 4

Distribution of Weighted Faculty Questionnaire Responses
Stratified by Instructional Division

Instructional Division	Questionnaire Item Two Responses											Total Responses	Weighting Factor
	A	B	C	D	E	F	G	H	I	J1	J2		
Business Science	2.9	2.9	0	4.3	7.1	1.4	0	1.4	0	0	0	20.01	1.43
Counseling	3.2	9.5	0	0	6.3	0	0	0	0	0	0	19.00	1.58
Fine Arts	4.8	14.4	0	0	0	0	0	4.8	0	0	0	24.00	4.80
Health Science	12.7	1.6	1.6	1.6	1.6	0	0	0	0	0	0	18.99	1.58
Learning Resources	1.5	4.5	1.5	0	1.5	0	0	0	0	0	0	9.00	1.50
Liberal Arts	2.2	8.7	2.2	0	6.6	2.2	0	0	0	2.2	0	23.99	2.18
Math., Science	7.2	15.8	1.4	0	0	0	0	2.86	0	5.73	0	32.97	1.43
Physical Education	4.6	4.6	4.6	2.3	0	0	0	0	0	0	0	16.00	2.29
Social Science	7.6	9.5	0	0	0	1.9	0	0	0	0	0	19.00	1.90
Technology	3.8	0	3.8	3.8	6.3	0	1.3	0	0	0	0	19.00	1.27
Emeritus Institute	2.0	0	0	0	0	0	0	0	0	0	0	2.00	2.00

Table 4 (continued)

	Questionnaire Item Two Responses											Total Responses	Weighting Factor
	A	B	C	D	E	F	G	H	I	J1	J2		
Total Number of Responses	52.3	71.4	15.1	12.0	29.4	5.5	1.3	9.1	0	7.9	0	203.96	
Percent of Responses N = 204	25.7%	35.0%	7.4%	5.9%	14.4%	2.7%	0.6%	4.5%	0%	3.9%	0%		

Note: J1 refers to "other" responses supportive of Mathematics Department exclusivity
J2 refers to "other" responses not supportive of Mathematics Department exclusivity

APPENDIX I

DISTRIBUTION OF WEIGHTED STUDENT RESPONSES
TO QUESTIONNAIRE ITEMS ONE AND TWO

Table 5

Distribution of Weighted Student Responses
To Questionnaire Items One and Two

Item One Response	Item Two Response A	B	C	D	E	F	G	H	I	J	Total Responses	Percent N = 1863
Business Science	200.8	87.4	39.3	55.4	91.2	10.7	9.7	40.3	24.0	0	558.7	30.0%
Fine Arts	68.9	33.5	11.0	30.1	39.2	19.4	0	13.7	24.1	0	239.8	12.9%
Health Science	79.0	27.1	18.9	23.0	27.4	9.1	3.9	1.8	6.3	0	196.3	10.5%
Liberal Arts	57.5	28.2	13.1	11.7	24.7	0	0	4.6	0	0	139.8	7.5%
Math., Science	77.0	50.9	15.8	11.8	10.4	1.8	1.8	12.3	7.4	0	189.09	10.1%
Physical Education	27.2	5.1	7.2	2.2	10.7	0	0	9.7	4.6	0	66.63	3.6%
Social Science	47.2	19.3	6.1	9.5	2.2	3.5	0	3.8	6.1	0	97.66	5.2%
Technology	36.9	17.0	6.1	6.5	11.7	3.9	0	2.2	6.3	0	90.51	4.9%
Undecided	105.6	39.6	26.1	33.7	43.8	12.0	9.7	7.5	6.5	0	284.36	15.3%
Other	0	0	0	0	0	0	0	0	0	0	0	0.0%

Table 5 (continued)

	Item Two Response										Total Responses	Percent N = 1863
	A	B	C	D	E	F	G	H	I	J		
Total Number of Responses	700.1	308.0	143.4	183.8	261.1	60.4	25.0	95.9	85.2	0	1862.9	
Percent of Responses N = 1863	37.6%	16.5%	7.7%	9.9%	14.0%	3.2%	1.3%	5.1%	4.6%	0		100%